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U.S. PATENT APPLICATION OF

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relating to

SUCTION AND DIRECTIONAL IRRIGATION APPARATUS

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Description

SUCTION AND DIRECTIONAL IRRIGATION APPARATUS

Technical Field

5 This invention relates to surgical devices that are utilized in surgical procedure on a patient where the surgeon requires both irrigation and suction capabilities and particularly, to a simple, hand-held, easy to use, combined suction and irrigation instrument that includes mechanism for obtaining positive directional capabilities for the irrigator portion of the instrument.

10 Background of the Invention

As is well known in the medical technology when surgeons perform minimal invasive surgery as, for example, arthroscopic, laparoscopic or endoscopic surgical procedures, it is often necessary to supply irrigation fluid or to remove fluid from the surgical site. There are a sundry of such instruments that are available and described in the literature. Obviously, for 15 achieving an effective and efficient surgical procedure with a minimal of trauma to the patient, the probe for providing irrigation fluid or for the removal of fluid from the surgical site needs to be small, simple and easy to operate.

An example of a suction/irrigation probe is described in U. S. Patent 20 No. 6,086,554 granted to Humphreys, Jr. et al on July 11, 2000 entitled *SURGICAL SUCTION/IRRIGATION PROBE ASSEMBLY WITH A*

ROTATABLE ADAPTOR where the adaptor is rotatable 360 degree (°) about an axis and connects to a plurality of tubes that include a supply of irrigation fluid or to a suction pump that removes liquid from the surgical site. A single tube is operatively connected to the adaptor to allow for the connection to anyone of the ports. Hence, a single outlet is configured to supply the irrigation fluid or the suction to a surgical site and a switch in the hand piece allows the surgeon to choose to supply either irrigation fluid or the vacuum.

Other types of irrigation and suction instruments are commonly used and described in the literature for performing these functions for eye surgery and stomach pumping. For example, U. S. Patent No. 883,583 entitled *STOMACH PUMP* granted to Stallsmith in March 31, 1908 describes a stomach pump that include induction and eduction tubes mounted side by side that is intended to fit through the esophagus. U. S. Patent No. 6,340,355 entitled *INTRAOCULAR IRRIGATION/ASPIRATION DEVICE* granted to Barrett on January 22, 2002 describes apparatus that includes a pair of concentric tubes with the inner tube including a lumen having a bulbous portion on the distal end with a side orifice for flowing irrigation fluid and alternately providing a lumen for the suction function. The outer tube is made from an elastomeric material so that it is flexible, while the inner tube is metallic and rigid.

Other types of irrigation and suction medical instruments are intended to be used for different medical procedures and hence, include various tips that attach to the distal end of the instrument. An example of this type is instrument is described in U. S. Patent No. 5,792,098 that include various sizes of

irrigation tips that are removably connected to a hand-held irrigation/suction hand piece.

While these instruments described in the above paragraph are capable of performing the functions described in this literature, we have found that we can provide the irrigation/suction function in a more simplified apparatus that gives the surgeon a good feel in handling the device with the capability of automatically applying the suction to the surgical site by a simple movement of a thumb or finger and that the direction of the irrigation is adjustable by a simple lifting and rotation of the irrigation tube with the assurance that the direction of the jet stream of irrigation fluid is held constant until changed by the surgeon. The invention is characterized as being uncomplicated and relatively inexpensive to manufacture, easy to operate, having a good feel for the surgeon, being reliable with the capability of applying suction or directional irrigation by a simple hand operated procedure.

Summary of the Invention

The object of this invention is to provide an improved suction and directional irrigation instrument that is used in the performance of medical procedures.

A feature of this invention is the inclusion of a sleeve for supporting one of the tubes to the other tube so that the irrigation tube is adjustable for changing the direction of the jet of the irrigation fluid discharging therefrom.

Another feature of this invention is providing a by-pass in the suction lumen of the suction tube that allows the selective application of suction to the

surgical site by a positioning of the finger or thumb of the surgeon.

5 This invention is characterized as being a hand-held irrigation/suction apparatus that is simple to make, relatively inexpensive, ease of use with a good feel for the surgeon and provides directional irrigation and the ability to apply the suction by a mere movement of the finger or thumb of the surgeon.

The foregoing and other features of the present invention will become more apparent from the following description and accompanying drawings.

Brief Description of the Drawings

10 Fig. 1 is a perspective view of the suction/directional irrigation apparatus of this invention;

Fig. 2 is a fragmentary perspective enlarged view of the mechanism for changing the direction of the irrigation portion of the suction/directional irrigation apparatus taken from lines 2-2 of Fig 1;

15 Fig. 2a is a view identical to the portion of the device depicted in Fig. 2 illustrating the movement of the irrigation tube during the process of changing direction;

Fig. 3 is a partial view in perspective of the instrument depicted in Fig. 1 illustrating the relationship of the directional irrigation discharge orifice and the suction tube of this invention; and

20 Fig. 4 is an enlarged sectional view taken along the lines 4-4 of Fig. 2.

These figures merely serve to further clarify and illustrate the present invention and are not intended to limit the scope thereof.

Detailed Description of the Invention

The invention is best illustrated by referring to all of the Figs. which show the suction and directional irrigation apparatus generally illustrated by reference numeral 10 as comprising a suction tube 12 and an irrigation tube 14 made from a suitable surgical metallic material, each having a lumen for providing the irrigation and suction functions to a surgical site. The suction tube 12 includes a fitting 16 at the proximal end 18 for attaching to a suction line or hose (not shown) and an inlet 20 at the distal end 22. The suction tube 12 includes an orifice 24 that communicates with the suction lumen 25 and a thumb or finger platen or curved dish 26 with the continuation of the orifice 24 affixed to the outer surface of suction tube 12 and located adjacent to the proximal end so as to afford easy access to the surgeon. When the suction tube is in operation, i.e. connected to a suction pump (not shown) the path of the suction or vacuum is through the hose (not shown), the fitting 16 and orifice 24 (when in the un-blocked position), the path of the suction or vacuum includes the orifice 24 and hence, by-passes the inlet 20 of the suction tube 12. In other words, when the surgeon desires not to place a vacuum in the surgical site, he leaves his finger or thumb off of orifice 24 so that the vacuum by-passes the surgical site (not shown) . To connect the inlet to the suction pump via the fitting 16 and hose (not shown) the surgeon merely places a thumb or finger of his hand over the orifice 16, closing it off, so the path is not short circuited and connects the surgical site directly to the vacuum pump (not shown). Toward the proximate end the suction tube 12 and the irrigation tube are bent so as to provide space for the surgeon to hold the apparatus 10 and

rest his finger or thumb on or in the vicinity of the orifice 24.

5 The irrigation tube 14 also includes fitting 30 at the proximate end 32 of the irrigation tube 14 which similar to the fitting 18 serves to accommodate a hose or the like (not shown) connected to the irrigation fluid source (not shown). Irrigation tube is retractable and removable and is supported in sleeve 34 which, in turn, is affixed to the outer surface of suction tube 12. The irrigation tube 14 carries a ring-like member 36 which carries a downwardly (in the direction of the distal end) projecting cylindrical rod 38. Affixed to or made integral with sleeve 34 is the gear-like ring member 40 that includes
10 sinusoidally configured hills 42 and valleys 44 and the valleys 44 complement the rod 38 so that the rod 38 fits into these valleys as will be described in more detail hereinbelow.

The discharge aperture 46 at the distal end 48 of the irrigation tube 14 communicates with the irrigation lumen 27 and is located at the side surface thereof spaced from the end 50. To change the direction of the jet stream
15 egressing from the discharge aperture 46, the tube 14 is lifted in the direction toward the proximate end 32 to pass the end 41 of the gear-like member 40 and then, rotated to fit into any of the other valleys 44 of the gear-like member 40.

20 The design of this suction and directional irrigation apparatus locates the distal end 22 of the suction tube 12 to protrude beyond the distal end 48 of the irrigation tube 14. The distance of separation of the ends is determined by the shoulder 60 of the ring-like member 36 that abuts against the end face 62 of the gear-like member 40.

In operation, the surgeon simply closes and opens the aperture 24 to turn on and off the suction from the surgical site and raises and turns the irrigation tube 14 as shown in Fig. 2a to change the direction of the jet stream of the irrigation liquid discharging therefrom. Not only is this apparatus user friendly, it is easily autoclaved for being reused and simple and inexpensive to manufacture. Users of this instrument indicate that it has a good feel and facilitates that process in the overall medical procedure.

Although this invention has been shown and described with respect to detailed embodiments thereof, it will be appreciated and understood by those skilled in the art that various changes in form and detail thereof may be made without departing from the spirit and scope of the claimed invention.

It is claimed: